

GRUPE CONSULTATIF SYLLABUSES ACTUARIAL ASSOCIATION OF EUROPE
A-CORE SYLLABUS FOR ACTUARIAL TRAINING IN EUROPE
OCTOBER 2018

PART ONE: GUIDELINES ~~FOR TO~~ THE AAE CORE SYLLABUS

Introduction

1. ~~In accordance with Article 5 'Criteria for Full Membership' of the Statutes of the Actuarial Association of Europe (AAE) the following core syllabus has been adopted by the General Assembly.~~

2. The ~~e~~Core ~~s~~Syllabus for ~~a~~Actuarial ~~t~~Training in Europe is presented in Part Two of this document. In part one of the document this section guidelines ~~to for~~ the use of the syllabus are presented.

Mutual Recognition

3. All Full Membership Associations are bound to the Mutual Recognition Agreement of the AAE.

4. The AAE Core Syllabus should be consistent with the Mutual Recognition Agreement regarding practical experience.

Purpose of the Core Syllabus

5. The purpose of the AAE Core Syllabus is to define a common understanding and to achieve a harmonization of the basic actuarial education as laid out in the detailed learning areas throughout Full Membership Associations. By that, the Core Syllabus is intended to underpin the Mutual Recognition Agreement and the Statutes of the AAE.

6. The Core Syllabus defines the minimum education standards defined in Article 5 of the AAE Statutes. All members of the AAE have to comply with these minimum education standards.

2. ~~This syllabus is intended to underpin the mutual recognition agreement and the statutes of Groupe Consultatif.~~

3. ~~The core syllabus will also provide a tool to aid associations in reviewing their own syllabuses. All associations will wish to implement it in their own way.~~

7. It is the responsibility of national associations to ensure that those admitted to the level of Full Membership relevant for Mutual Recognition have successfully completed all aspects of the Core Syllabus. The AAE Education Committee will check compliance on a regular basis.

8. The AAE Core Syllabus does not prescribe an education process, leaving this to every national association. There are many different effective actuarial education and qualification programs which vary from organization to organization and country to country.

9. ~~4. The AAE eCore sSyllabus also will provide~~ provides a tool to new national associations wishing to develop a syllabus.

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5. — It is the responsibility of member associations to ensure that those admitted to the level of membership relevant for mutual recognition have successfully completed all aspects of the core syllabus.

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Structure of the Syllabus Presentation

10.6. — The AAE Core Syllabus has been prepared as four stages: has nine learning areas. Each learning area contains a number of topics and sub-topics. The following criteria are set to ensure appropriate breadth of coverage:

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- a. All learning areas in the AAE Core Syllabus must be covered.
- b. Learning areas/topics/sub-topics do not need to be grouped or packaged in the same manner as in the Syllabus.
- c. Some learning areas may be required by an association to be taken as pre-study or pre-requisite to actuarial study.
- d. Some learning areas might contain topics that will be covered before starting the formal actuarial education.
- e. Some learning areas might require specific pre-knowledge that is not explicitly mentioned in a learning area of the AAE Core Syllabus.
- f. The learning areas should not be treated as being of equal weight when prescribing a full qualification process.
- g. Different associations will give more or less weight to the various topics/sub-topics within each learning area based on the needs for actuaries in the markets that each association services.

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11. In assessing the depth of coverage of any one learning area there may be some averaging across all topics/sub-topics as depth of treatment of different topics/sub-topics within that learning area may vary. An indication of the depth of each sub-topic is set out with reference to the Bloom's Taxonomy.

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12. Members of Full Membership Associations need to have a solid mathematical education. The Appendix 'Foundation Mathematics' in this sense only defines the minimum to enable students to develop an adequate foundation upon which to build the additional mathematical skills required for successful actuarial practice.

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13. In addition to the nine basic learning areas and the necessary mathematical background actuarial associations need to include a specialization stage. Included in this stage are subjects and items which are needed for an actuary in order to be a specialist within a certain country or certain area of actuarial work. Each actuary is expected to have studied to the appropriate level in at least one specialism.

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Generic Technical Subjects

Included in this stage are subjects that are not unique to actuarial science but are essential background for study in this area. The subjects need not be covered individually but could be integrated with other subjects.

Actuarial Technical Subjects

Included in this stage are subjects that form the fundamental tools for actuarial science and finance.

Actuarial Applications

Included in this stage are subjects in which the principles and practice of actuarial techniques are developed in a variety of applications areas. The purpose at this stage is to provide a generalised framework for actuarial risk management for varying types of risk. The subjects need not be covered individually but the

actuarial concepts are important with examples to demonstrate different approaches depending on the different nature of risk.

Specialisation

Included in this stage are subjects and items which are needed for an actuary in order to be a specialist within a certain country or certain area of actuarial work and risk management. Each actuary is expected to have studied to the appropriate level in at least one specialism.

Student actuaries will need to study the regulatory, legislative, cultural and administrative framework of the EU and the country in which they intend to work.

Depths of coverage

14. The AAE Core Syllabus, in accordance with the IAA Education Syllabus, illustrates the depth of knowledge and application by using the Model of Learning Objectives created by Rex Heer, Iowa State University. This Model is based on Bloom's Taxonomy of Education Objectives (1956) and Anderson and Krathwohl's 2001 revision.

15. The Model of Learning Objectives uses both a knowledge dimension and a cognitive process dimension as demonstrated in the table below:

Revised Bloom's Taxonomy (RBT) Cognitive Process Dimension						
Verbs →	1. REMEMBER Recognize, Recall	2. UNDERSTAND Interpret, Exemplify, Classify, Summarize, Infer, Compare, Explain	3. APPLY Execute, Implement	4. ANALYZE Differentiate, Organize, Attribute	5. EVALUATE Check, Critique	6. CREATE Generate, Plan, Produce
Objects ↓						
A. Factual Knowledge	A1	A2	A3	A4	A5	A6
B. Conceptual Knowledge	B1	B2	B3	B4	B5	B6
C. Procedural Knowledge	C1	C2	C3	C4	C5	C6
D. Metacognitive Knowledge	D1	D2	D3	D4	D5	D6

16. Adopting this model of Learning Objectives accommodates defining both the areas of learning achievement expected of future actuaries and also the specific level and type of knowledge suggested. This framework is widely used and provides associations a way of linking the learning objectives with appropriate learning activities and assessments.

17. The model uses four types of knowledge – Factual, Conceptual, Procedural and Metacognitive – and six cognitive processes – Remember, Understand, Apply, Analyze, Evaluate and Create;

- Factual knowledge** generally involves terminology associated with actuarial work and specific details with respect to financial security systems, actuarial models, actuarial methods and the external forces important to actuarial work. Factual knowledge also includes specific details with respect to membership in the actuarial profession.
- Conceptual knowledge** generally involves the interrelationships among current or potential future financial security systems, common actuarial models, common actuarial methods, external forces and the actuary.

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- c. **Procedural knowledge** involves how an actuary actually does something. To demonstrate Procedural Knowledge often requires both Factual and Conceptual knowledge. Many practical skills require Procedural knowledge.
- d. **Metacognitive knowledge** involves an actuary's awareness of his/her strengths and weaknesses, including when the actuary is not qualified to do specific work. This knowledge will also include an actuary's awareness of personal learning needs and a lifetime learning strategy. Some normative skills involve acquiring Metacognitive knowledge (e.g. self-knowledge).

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18. The six categories of the cognitive process include nineteen specific cognitive processes that clarify the scope of the six categories. There is a natural order for cognitive processes from the lowest order thinking skills "Remember", through "Understand", "Apply", "Analyze" and "Evaluate" to the highest cognitive order "Create". The order does not mean to imply difficulty in succeeding at the cognitive level but rather that the lower cognitive process will be subsumed by another higher cognitive process. For example, you would often need to "Remember" to "Create".

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19. A suggested Bloom's Taxonomy category is included in the AAE Core Syllabus for each sub-topic as an indication of the depth recommended. This is not meant to be prescriptive, but is intended to assist in setting out a guideline for the depth of knowledge and skill needed for an actuary.

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7. Within each stage topics have been presented under a number of subject headings. This grouping has been done to aid comprehension and assimilation. The subjects should not necessarily be considered to be of equal weight. It is anticipated that each education provider will choose to regroup the topics in ways that are deemed to be appropriate for each particular environment and method of syllabus delivery.
8. The subjects, particularly the Generic Technical subjects, contain many topics that might be covered before starting the formal actuarial education. Again there will be differences between education providers in this respect. It is not important at which stage topics are covered, only that students gain proficiency in them and that they are reflected in the membership entry requirements of the individual associations.
9. It is not necessary for all topics in the General Skills to be directly assessed during formal actuarial education. They might be assessed indirectly, as commented on some subjects. As one example, language skills could be assessed through the use of teaching material in different languages, rather than through language exams.
10. Education providers may well regroup topics presented here in different stages to be covered within a subject which covers more than one stage. Thus in some education programmes the mathematical background and practical consideration of particular topics may be covered together. The order in which subjects and topics are covered will also be the decision of each education programme.
11. It is recognised that in different countries actuarial education may be offered through universities, through the professional association or through a combination of both. The balance between more theoretical and more practical considerations will vary under different systems. Emphasis will also vary between countries.
12. Student actuaries need to develop higher order skills of analysis, synthesis and judgement. This may be achieved through different forms of study and assessment such as a dissertation or through practical work experience.
13. This syllabus concentrates on content of courses and does not deal with learning approaches or assessment methods.
14. Post qualification training will be necessary to ensure that actuaries are up to date with changes in the framework for their practice area. Continuing Professional Development (CPD) schemes will be helpful in this respect. Associations are recommended to have a CPD policy and to support its members with CPD activities.

Syllabus Themes for the Training of Actuaries

15. In the training of actuaries it is important that actuaries understand the principles of modelling with the practical considerations for the use of models. This theme will be encouraged where appropriate in all syllabuses.
16. Through the generalised applications stage students are encouraged to understand the principles of actuarial risk management. Actuaries are increasingly working with new products covering new types of risk and for this reason students are encouraged to consider wider types of risk than the ones in which they are currently practising.
17. It is important that student actuaries are aware of the business environment in which they will be working.

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Core Syllabus Development

20. There is a commitment to keep this syllabus under review and to update it as appropriate on a regular basis. It is important that the syllabus does not become obsolete over time and prepares actuaries to work in the context of current European legislation.

21. All aspects of the IAA Education Syllabus are covered by the AAE Core Syllabus and in addition knowledge of a particular area of practice in the relevant country.

~~18. — There is a commitment to keep this syllabus under review and to update it as appropriate on a regular basis. It is important that the syllabus does not become obsolete over time and prepares actuaries to work in the context of current European legislation~~

~~19. — It is the intention that all aspects of the IAA Core Syllabus are covered by the Core Syllabus of Groupe Consultatif and in addition knowledge of a particular area of practice in the relevant country.~~

Mutual Recognition

~~20. — Within the Groupe Consultatif there is a mutual recognition agreement for fully qualified actuaries and the purpose of this syllabus is to develop as far as the Actuarial Applications stage a harmonisation of syllabuses throughout member countries.~~

~~21. — The Core Syllabus should be consistent with the Groupe's Mutual Recognition Agreement regarding practical experience.~~

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PART TWO: GROUPE CONSULTATIF SYLLABUSES

GENERAL SKILLS

1. ~~Computing~~

Aim: ~~To provide a grounding in modern computing methods necessary for the work of an Actuary.~~

~~The student is expected to have a working knowledge of modern information communication and technology (ICT) as appropriate for the work of an actuary.~~

~~A formal assessment of this part is not necessary.~~

2. ~~Regulation and Legislation and Taxation~~

Aim: ~~To give students an appreciation of the structures and legislative instruments of the EU. This part is recommended as part of a European qualification.~~

- ~~(a) Purpose of international structures~~
- ~~(b) Understanding variations in country cultures~~
- ~~(c) Structures within the EU~~
- ~~(d) Relevant EU legislation~~

~~A formal assessment of this part is not necessary.~~

3. ~~Communication Skills~~

Aim: ~~To develop the ability to present actuarial ideas and arguments both on paper and orally in a manner which will enable them to be understood by non-actuaries.~~

Objectives:

- ~~(a) The student would be expected to be able to draft a written communication intended to be read by a lay person to a standard where the draft would:
 - ~~be acceptable as a final document without major changes or rewriting, though a moderate number of more minor changes might still be required (a standard which might be appropriate for a newly qualified actuary, rather than a specialist experienced actuary),~~
 - ~~convey the major concepts and contain no major mis-statements of fact or omissions or unsupported opinion.~~~~
- ~~(b) The student would also be expected to be able to make an oral presentation on a technical subject to a lay person.~~

~~A formal assessment of this part is not necessary.~~

4. ~~Language Skills~~

Aim: ~~To enable students to communicate in business discussions and to read actuarial literature in at least two of the languages of the countries within the EU. This part would not be compulsory but is recommended as part of a European qualification.~~

~~A formal assessment of this part is not necessary.~~

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GENERIC TECHNICAL SUBJECTS

The subjects at this stage are:

1. Mathematics
2. Probability and Statistics
3. Stochastic Processes and Modelling
4. Economics
5. Accounting and Financial Reports

Actuarial students may have studied many of these topics before starting formal actuarial education. In the others, assessment may have been at earlier stages of education.

1. — Mathematics

Aim: To provide a grounding in relevant mathematics.

- (a) Mathematical analysis
- (b) Linear algebra
- (c) Numerical analysis
- (d) Stochastic calculus

2. — Probability and Mathematical Statistics

Aim: To provide a grounding in relevant probability and mathematical statistics.

- (a) Theory of probability and mathematical statistics
- (b) Decision theory
- (c) Data analysis
- (d) Regression analysis

3. — Stochastic Processes and Modelling

Aim: To provide a grounding in stochastic processes and modelling methodology.

- (a) Principles and methods of modelling
- (b) Stochastic processes for insurance and finance
- (c) Time series modelling
- (d) Simulation methods

4. — Economics

Aim: To provide a grounding in the fundamental concepts of economics as they affect the operation of insurance and other financial systems.

- (a) Macroeconomics
- (b) Microeconomics

5. — Accounting and Financial Reports

Aim: To provide a grounding in understanding and interpreting the accounts and financial statements of companies and financial institutions.

- (a) Accounting principles
- (b) Financial structures of business entities
- (c) Basic structure of company accounts
- (d) Interpretation of business accounts

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6. Legislation

Aim: To provide a grounding, understanding and application of the legislation that applies to financial institutions.

- (a) Supervisory legislation
- (b) Financial services laws

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ACTUARIAL TECHNICAL SUBJECTS

The subjects at this stage are:

- 7. Financial Mathematics
- 8. Multiple State Modelling
- 9. Contingencies
- 10. Risk Mathematics
- 11. Finance and Financial Markets
- 12. Quantitative Risk Management and Solvency

7. Financial Mathematics

Aim: To provide a grounding in financial mathematics and their applications to actuarial science.

- (a) Theory of deterministic interest
- (b) Introduction to contingent claims analysis
- (c) Stochastic calculus for finance
- (d) Theory of stochastic interest
- (e) Asset management

8. Multiple State Modelling

Aim: To provide a grounding in multiple state modelling

- (a) Survival models and parameter estimation
- (b) Multiple state models and parameter estimation
- (c) Construction of a decrement table
- (d) Population characteristics and risk classification

9. Contingencies

Aim: To provide a grounding in the mathematical techniques, including stochastic techniques, which are of relevance to actuarial work.

- (a) Reserving methodology
- (b) Pricing of long term and short term insurance products
- (c) Valuation techniques
- (d) Analysis of changes in technical results

10. Risk Mathematics

Aim: To provide a grounding in risk mathematics and its use in actuarial work.

- (a) Distribution of frequency and severity of claims
- (b) Risk theory
- (c) Credibility theory
- (d) Dependencies
- (e) Generalised linear models

11. Finance and financial markets

Aim: To provide a grounding in finance, investment and portfolio theory.

- (a) Financial markets
- (b) Pricing and valuation of financial products
- (c) Corporate finance
- (d) Portfolio theory
- (e) Economic value and measurement

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12. Quantitative Risk Management and Solvency

Aim: To provide a grounding in the quantitative aspects of risk management

(a) Risk classification

(b) Measuring risk

(c) Diversification

(d) Dynamic financial analysis and internal models

(e) Capital requirements

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ACTUARIAL APPLICATIONS

Introduction:

The subjects at this stage are:

- 13. Actuarial Enterprise Risk Management
- 14. Professionalism

13. Actuarial Enterprise Risk Management

Aim:

To provide the technical skills to apply the principles and methodologies studied under actuarial technical subjects for the identification, quantification and management of risks.

Topics:

- 1. The general operating environment of the enterprise
- 2. Assessment of risks; risk types and risk measures
- 3. Design and pricing of products and/or services
- 4. Determination of assumptions and scenario setting
- 5. Reserving and valuation of liabilities
- 6. Risk mitigation
- 7. Asset Liability Management
- 8. Monitoring the experience and exposure to risk
- 9. Solvency and profitability of the enterprise and the management of capital

14. Professionalism

Aim:

To develop an awareness of the meaning of professionalism, the importance of professionalism in the work of an actuary and some of the professionalism issues which may arise in the course of that work.

Topics:

- 1. Conduct standards and discipline
- 2. Professional Standards
- 3. Professionalism and business ethics

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Formatiert: Einzug: Links: 0 cm, Erste Zeile: 0 cm, Leerraum zwischen asiatischem und westlichem Text nicht anpassen, Leerraum zwischen asiatischem Text und Zahlen nicht anpassen, Tabstopps: Nicht an 1,27 cm

Formatiert: Leerraum zwischen asiatischem und westlichem Text nicht anpassen, Leerraum zwischen asiatischem Text und Zahlen nicht anpassen, Tabstopps: Nicht an 1,27 cm

Formatiert: Einzug: Links: 0 cm, Erste Zeile: 0 cm, Leerraum zwischen asiatischem und westlichem Text nicht anpassen, Leerraum zwischen asiatischem Text und Zahlen nicht anpassen, Tabstopps: Nicht an 1,27 cm

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Formatiert: Keine Aufzählungen oder Nummerierungen, Leerraum zwischen asiatischem und westlichem Text nicht anpassen, Leerraum zwischen asiatischem Text und Zahlen nicht anpassen

SPECIALISATION

Candidates will be required to study at least one of the applications areas in greater depth to gain the full qualification for their association. In this stage student actuaries should demonstrate the ability to develop higher order skills of analysis, synthesis and judgement.

Possible areas of specialisation:

- Life
- Pensions
- General insurance
- ERM
- Investments
- Health care
- Banking
- Social security
- Reinsurance

Where there is relevant European Union and country specific legislation, student actuaries must acquire a fuller understanding of that legislation over the knowledge acquired in section 6 (Legislation).

The specialisation could be one or more of

- (a) Deeper studies
- (b) Studies of European and country specific topics
- (c) Research
- (d) Practical application of principles

Formatiert: Tabstopps: Nicht an 1,27 cm